Northern Technical University
الجامعة التقنية الشمالية

Bachelor of Science (B.Sc.) – Fuel and Energy Techniques Engineering

البكالوريوس التقني - هندسة تقنيات الوقود والطاقة

Table of Contents | جدول المحتويات

1. Mission & Vision Statement

Vision Statement

The mission of the Department of Fuel and Energy Techniques Engineering is to actively promote the educational process and move it toward realistic and field-based practice in order to remain

ahead of the curve and maintain outstanding learning skills and strong entry into the job market, keeping pace with developments in curricula and modern technology and providing a laboratory Process for students to conduct experiments that connect the theoretical side with the practical side.

Mission Statement

Providing high-quality academic programs that align with scientific and technological advancements at the local, regional, and global levels, and actively participating in the development of engineering technologies and continuous improvement of the educational and research system in the college through continuous collaboration with relevant entities in various engineering and technical disciplines.

2. Program Specification

Programme code:	BSc-FETE	**ECTS**	240
Duration:	4 levels, 8 Semesters	**Method of Attendance:**	Full Time

The Department of Fuel and Energy Techniques Engineering was established in 1998, as it is considered one of the outstanding departments in the Technical College of Engineering / Kirkuk, and it is almost one of the rare departments in Iraq in terms of privacy and specialization, and as we know that our country, Iraq, is one of the countries that depend on oil wealth and it is a fuel and energy source, that is why we divided This graduate technical engineers specializing in this field, and its feature is its geographical location, Kirkuk, the province, The dependence of the employment market on companies and refineries in both the public and private sector falls directly on this faculty.

The Department of Fuel and Energy Techniques Engineering is a specialized department that focuses on the study, development, and application of technologies related to fuel and energy systems. It typically operates within academic institutions, research organizations, or government agencies.

The primary objective of the department is to address various challenges and advancements in the field of fuel and energy engineering. This can include studying and optimizing the production,

distribution, and utilization of different types of fuels, such as fossil fuels (coal, oil, and natural gas) or alternative energy sources (renewable energy, nuclear power).

The specific areas of study and research within the Department of Fuel and Energy Technical Engineering include:

Energy Conversion Technologies: Investigating different methods of converting energy from one form to another, such as the conversion of fossil fuels into electricity or the transformation of renewable energy sources into usable power.

Energy Efficiency and Conservation: Focusing on improving the efficiency of energy systems and developing strategies for energy conservation to reduce waste and environmental impact.

Renewable Energy Systems: Exploring and optimizing the use of renewable energy sources like solar, wind, hydro, geothermal, and biomass to provide sustainable alternatives to traditional fossil fuel-based energy systems.

Energy Storage and Distribution: Studying the development and application of energy storage technologies (batteries, fuel cells, etc.) and examining efficient methods for distributing energy to end-users.

Environmental Impact and Sustainability: Assessing the environmental consequences of energy production and consumption, and working towards sustainable energy solutions that minimize negative impacts on ecosystems and climate change.

Energy Policy and Economics: Analyzing the economic aspects of fuel and energy systems, evaluating policy frameworks, and providing recommendations for energy-related policies and regulations.

The Department of Fuel and Energy Techniques Engineering plays a crucial role in advancing the understanding and application of energy technologies, ensuring efficient and sustainable energy systems, and addressing the global energy challenges faced by society.

At the introductory level (Level 1) of fuel and energy techniques engineering, students are typically exposed to the fundamental concepts and principles of the field. The curriculum aims to provide a broad understanding of the various aspects related to fuel and energy, laying the groundwork for more specialized studies in higher levels. At Level 2 of a fuel and energy technical

engineering program, students delve deeper into the core topics of the field. The focus shifts towards acquiring more specialized knowledge and skills that will prepare them for advanced and specialized modules at Levels 3 and 4. These program-specific core topics provide a solid foundation for students to progress to more specialized modules and advanced topics at Levels 3 and 4. At these higher levels, students may have the opportunity to focus on areas like renewable energy integration, energy policy and planning, energy-efficient building systems, advanced power generation technologies, or other specialized subjects based on their interests and career aspirations. According to the University and College Mission statements, the training of graduate students in fuel and energy technical engineering includes an emphasis on appreciating how research informs teaching. This approach acknowledges the close relationship between research and teaching and recognizes the benefits of integrating research findings and methodologies into the educational experience. By integrating practical and lab methods into the curriculum, students are exposed to research-oriented practices and develop a research ethos early on in their graduate studies. These experiences lay the foundation for future research endeavors and foster a mindset of inquiry, critical analysis, and evidence-based decision making in the field of fuel and energy technical engineering.

Overall, the tutorials in the fuel and energy technical engineering program serve as a space for students to develop both general and subject-specific skills. The inclusion of workshops, assessed exercises, and ongoing support from the same tutor fosters a supportive and progressive learning environment. Individual needs, including international years and industrial placements, are acknowledged and accommodated to the best extent possible through discussions with the appropriate tutor.

3. Program Goals

1. The Department of Fuel and Energy Technical Engineering has several overarching goals that drive its mission and shape its educational programs. While the specific goals may vary depending on the department's context and objectives, here are some common program goals:

2. Develop Technical Expertise: The department aims to provide students with a solid foundation in fuel and energy technical engineering. This includes a comprehensive understanding of energy sources, conversion technologies, energy systems analysis, and

related engineering principles. The goal is to equip students with the technical knowledge and skills necessary to address complex challenges in the field.

3. Foster Research and Innovation: The department seeks to foster a culture of research and innovation among students and faculty. This involves promoting active engagement in research activities, encouraging the exploration of new ideas, and providing opportunities for students to contribute to the advancement of knowledge in fuel and energy technical engineering.

4. Promote Sustainable Energy Solutions: Recognizing the importance of sustainability, the department aims to educate students about the principles and practices of sustainable energy solutions. This includes studying renewable energy sources, energy efficiency, environmental impact assessment, and the integration of sustainable practices into energy systems design and operation.

5. Enhance Problem-Solving and Analytical Skills: The department strives to develop students' problem-solving and analytical skills. Through a combination of theoretical coursework, practical lab experiences, and real-world case studies, students are encouraged to think critically, analyze complex problems, and propose innovative solutions in the field of fuel and energy technical engineering.

6. Prepare for Professional Practice: The department aims to prepare students for successful careers in the fuel and energy industry. This includes developing a range of professional skills such as communication, teamwork, project management, and ethical decision-making. Students are exposed to industry practices and are encouraged to participate in internships, industrial placements, or cooperative education programs to gain practical experience.

7. Cultivate Lifelong Learning: Recognizing the rapidly evolving nature of the fuel and energy sector, the department seeks to instill a commitment to lifelong learning among students. This includes promoting a curiosity for new knowledge, fostering self-directed learning skills, and equipping students with the ability to adapt to emerging technologies and industry trends throughout their careers.

8. Engage with Stakeholders: The department aims to engage with stakeholders, including industry professionals, government agencies, and the local community. Through

partnerships, collaborative projects, and knowledge exchange, the department strives to ensure that its programs and research activities align with the needs and priorities of the broader fuel and energy sector.

4. Student Learning Outcomes

The student learning outcomes of the Department of Fuel and Energy Technical Engineering are designed to specify the knowledge, skills, and abilities that students are expected to acquire by the completion of their program. While the specific learning outcomes may vary depending on the institution and program. The student learning outcomes reflect the knowledge, skills, and attributes that students are expected to acquire during their program of study in fuel and energy technical engineering. They align with the department's goals and ensure that graduates are well-prepared to make meaningful contributions to the field and address the challenges of the industry.

Outcome 1

Knowledge and Understanding

1. Energy Sources: Understand various energy sources, including fossil fuels, renewable energy technologies (such as solar, wind, hydro, biomass), and emerging energy sources (such as hydrogen and geothermal). Comprehend their characteristics, availability, extraction methods, and environmental impacts.
2. Energy Conversion Technologies: Gain knowledge about energy conversion technologies, such as combustion systems, power generation systems (including thermal, nuclear, and renewable energy systems), and energy storage technologies. Understand the principles behind these technologies and their operational aspects.
3. Energy Systems Analysis: Acquire an understanding of energy systems analysis, including energy efficiency, energy demand, and supply analysis. Comprehend energy flow, energy losses, and optimization techniques to enhance system performance and sustainability.
4. Thermodynamics and Heat Transfer: Understand the principles of thermodynamics and heat transfer as they apply to energy engineering systems. Comprehend concepts related to energy transfer, energy conservation, heat transfer mechanisms, and energy conversion efficiency.
5. Energy Policy and Economics: Familiarize oneself with energy policy frameworks, energy regulations, and economic considerations in the energy sector. Understand the interplay between energy policy, economics, and environmental sustainability in decision-making processes.

6. Environmental Impact: Recognize the environmental impacts associated with energy production, conversion, and consumption. Understand concepts related to pollution control, carbon emissions, life cycle assessment, and sustainable practices in the field of fuel and energy engineering.

7. Safety and Risk Assessment: Comprehend safety considerations, risk assessment methodologies, and hazard mitigation strategies in energy engineering projects. Understand the importance of adhering to safety regulations and implementing effective risk management practices.

8. Codes and Standards: Be familiar with relevant codes, standards, and regulations governing the design, operation, and maintenance of energy systems. Understand the importance of compliance with industry-specific standards and guidelines.

9. Emerging Trends and Technologies: Stay updated with emerging trends, advancements, and new technologies in the field of fuel and energy engineering. Acquire knowledge about current research and development efforts and their potential applications in industry.

10. Interdisciplinary Context: Recognize the interdisciplinary nature of fuel and energy engineering and its connections with other fields such as environmental science, materials science, economics, and policy. Understand the importance of collaboration and interdisciplinary approaches in addressing complex energy challenges.

Outcome 2

Oral and Written Communication

Effective communication skills are essential for fuel and energy engineering professionals to convey their ideas, research findings, and technical information to various audiences. Students in the Department of Fuel and Energy Technical Engineering are expected to develop strong oral and written communication skills.

Outcome 3

Laboratory and Field Studies

Laboratory and field studies play a crucial role in the education of fuel and energy engineering students, providing them with hands-on experience and practical skills. Students in the

Department of Fuel and Energy Technical Engineering are expected to develop competency in laboratory and field work.

Outcome 4

Scientific Knowledge

Scientific knowledge forms the foundation of fuel and energy engineering, providing the theoretical framework and understanding necessary for effective problem-solving and innovation. Students in the Department of Fuel and Energy Technical Engineering are expected to develop a strong scientific knowledge base.

Outcome 5

Problem-solving and Analytical Skills

Fuel and energy engineering professionals must possess strong problem-solving and analytical skills to address complex challenges in the field. Students in the Department of Fuel and Energy Technical Engineering are expected to develop and demonstrate proficiency in problem-solving and analytical thinking.

Outcome 6

Critical Thinking

Critical thinking is a crucial skill for fuel and energy engineering professionals, as it enables them to analyze information, evaluate arguments, and make informed decisions. Students in the Department of Fuel and Energy Technical Engineering are expected to develop and demonstrate strong critical thinking abilities.

Outcome 7

Subject-specific skills

Subject-specific skills are essential for fuel and energy engineering professionals to apply their knowledge and expertise in practical settings. Students in the Department of Fuel and Energy Technical Engineering are expected to develop and demonstrate proficiency in subject-specific skills relevant to the field.

1. Energy Systems Analysis: Analyze and evaluate energy systems, including power generation, distribution, and utilization, considering technical, economic, and environmental factors. Understand the principles and methodologies of energy systems modeling, optimization, and simulation.
2. Renewable Energy Technologies: Gain knowledge and practical skills in renewable energy technologies, such as solar power, wind energy, hydroelectric power, geothermal energy, and biomass energy. Understand the design, operation, and integration of renewable energy systems into the existing energy infrastructure.
3. Fossil Fuel Technologies: Familiarize oneself with fossil fuel-based energy technologies, including combustion processes, power plant design, and emissions control. Understand the environmental impact of fossil fuel utilization and explore strategies for cleaner and more efficient energy conversion.
4. Energy Efficiency and Conservation: Develop skills in energy efficiency assessment, energy auditing, and conservation strategies. Understand the principles and techniques for optimizing energy consumption in various sectors, including buildings, transportation, and industrial processes.
5. Energy Storage and Grid Integration: Acquire knowledge of energy storage technologies, such as batteries, pumped hydro storage, and thermal energy storage. Understand the challenges and opportunities of integrating renewable energy sources and energy storage systems into the electric grid.
6. Power Electronics and Control Systems: Gain expertise in power electronics and control systems used in energy conversion and distribution. Understand the design and operation of power electronic devices, such as inverters and converters, and their application in renewable energy systems.
7. Energy Policy and Economics: Develop an understanding of energy policy frameworks, regulations, and economic considerations in the energy sector. Analyze the impact of energy policies and market dynamics on fuel and energy engineering projects and decision-making.
8. Environmental Impact Assessment: Gain knowledge of environmental impact assessment methodologies and tools used to evaluate the environmental consequences of energy projects. Understand the principles of life cycle assessment and sustainable development in the context of fuel and energy engineering.

9. Computational and Modeling Skills: Develop proficiency in using computational tools, software, and programming languages relevant to fuel and energy engineering. Apply modeling and simulation techniques to analyze and optimize energy systems, assess performance, and predict outcomes.
10. Project Management: Acquire project management skills specific to fuel and energy engineering projects. Understand project planning, scheduling, resource allocation, and risk management principles. Develop effective communication and teamwork skills to collaborate with multidisciplinary teams.

5. Academic Staff

Morad A. Reduha | Ph.D. in Chemical engineering / fuel and energy | Lecturer.
Email: morad.a.radha@ntu.ed
Mobile no.: 07730128808

Ahmed S. Salaman | Ph.D. in Mechanical Engineering / thermal engineering. | Lecturer.
Email: ahmed.saadallah@ntu.edu.iq
Mobile no.: 07744558776

Musa M. Weis | Ph.D. in Mechanical Engineering / Applied engineering | Assistant Prof.
Email: Muusa.weis@ntu.edu.iq
Mobile no.: 07709332089

Rafeq A.Khalefa | Ms.C. in Mechanical Engineering / Motion systems eng. tech. | Assistant Prof.
Email: Rafeqahmed42@ntu.edu.iq
Mobile no.: 07702194176

Mohammed Z.Hasan | Ms.C. in Production eng. and minerals / minerals.| Assistant Prof.

Email: Mohamop49@ntu.edu.iq

Mobile no.: 07708577310

Susan sh.Ahmed |Ph.D. in Environmental Eng. / Environmental Eng.| Lecturer.
Email: Susan.ahmed@ntu.edu.iq
Mobile no.: 07511176815

Mohamad Q.Abd Alrahman | Ph.D. in Mechanical Eng. / Water Treatment | Lecturer.
Email: Mohammed83@ntu.edu.iq
Mobile no.: 07701331999

Ahmed.A.Hussein | Ms.C. in Mechanical Eng. Internal combustion engines.| Lecturer.

Email: Ahmedali@ntu.edu.iq
Mobile no.: 07701679062

Asan S.Mohamad | M.Sc. in fuel and energy. thermal engineering. | Assistant Lecturer.
Email: Assen.suad1984@ntu.edu.iq
Mobile no.: 07702370538

---

6. Credits, Grading and GPA

Credits

Northern Technical University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 student workloads, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Calculation of the Grade Point Average (GPA)

1. The GPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

   GPA of a 4-year B.Sc. degrees:

   GPA = [(1st module score x ECTS) + (2nd module score x ECTS) + ……] / 240

7. Curriculum/Modules

8. Contact

Level	Semester	No.	Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type
One	One	1	FEK 101	Analytical Chemistry	127	48	175	7.00	C
		2	FEK 102	Organic Chemistry	127	48	175	7.00	C
		3	FEK 103	Engineering Mechanics	65	60	125	5.00	C
		4	COGTEK 100	Mathematics Principles	80	95	175	7.00	B
		5	NTU 100	Human Rights & Democracy	35	15	50	2.00	B
		6	NTU 101	English Language	35	15	50	2.00	B
					469	281	750	30.00	
	Semester	No.	Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type
	Two	1	FEK104	Principles of Chemical Engineering	125	175	300	12.00	C
		2	COGTEK 103	Engineering Drawing	81	94	175	7.00	C
		3	COGTEK 102	Engineering Workshops	66	109	175	7.00	C
		4	NTU 102	Computer	37	13	50	2.00	B
		5	NTU 103	Arabic Language	35	15	50	2.00	B
					344	406	750	30.00	

Level	Semester	No.	Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type
Two	One	1	FEK201	Petroleum Refining	82	93	175	7.00	C
		2	FEK202	Vectors and Differntial Equations	81	69	150	6.00	B
		3	FEK203	Computer Programming - MATLEB	82	43	125	5.00	B
		4	FEK204	Material and Energy Balances	97	128	225	9.00	C
		5	NTU201	Professional Ethics	50	25	75	3.00	B
					392	358	750	30.00	
	Semester	No.	Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type
	Two	1	FEK206	Physical Chemistry	112	63	175	7.00	B
		2	FEK207	Engineering Statistics	82	68	150	6.00	B
		3	FEK208	Fluid Mechanics	112	88	200	8.00	C
		4	FEK209	Electrical Technology	82	43	125	5.00	B
		5	NTU200	English Language	50	50	100	4.00	B
					438	312	750	30.00	

Level	Semester	No.	Module Code	Module Name in English	SSWL	USSWL	SWL	ECTS	Module Type
Three	One	1	FEK301	Mass Transfer	112	88	200	8.00	C
		2	FEK302	Engineering Analysis	67	58	125	5.00	B
		3	FEK303	Environmental Pollution and Industrial Safety	52	48	100	4.00	S
		4	FEK304	Termodynamics	112	63	175	7.00	C
		5	FEK305	Gas Technology	82	68	150	6.00	C
					425	325	750	30.00	
	Semester	**No.**	**Module Code**	**Module Name in English**	**SSWL**	**USSWL**	**SWL**	**ECTS**	**Module Type**
	Two	1	FEK306	Heat Transfer	112	88	200	8.00	C
		2	FEK307	Numerical Analysis	67	83	150	6.00	B
		3	FEK308	Internal Combustion Engine	82	118	200	8.00	E
		4	FEK309	Fuel Cell Technology	82	118	200	8.00	E
		5	FEK310	Energy Resources	82	118	200	8.00	C
					425	525	750	30.00	
Level	**Semester**	**No.**	**Module Code**	**Module Name in English**	**SSWL**	**USSWL**	**SWL**	**ECTS**	**Module Type**
Four	One	1	FEK401	Plants and Equipment Design	97	103	200	8.00	C
		2	FEK402	Combustion and Explosion Technology	112	63	175	7.00	C
		3	FEK403	Control and Measuring Engineering	82	43	125	5.00	B
		4	FEK404	Sustainable Energy	81	94	175	7.00	C
		5	FEK405	Graduation Project (Research)	45	30	75	3.00	C
					417	333	750	30.0	
	Semester	**No.**	**Module Code**	**Module Name in English**	**SSWL**	**USSWL**	**SWL**	**ECTS**	**Module Type**
	Two	1	FEK406	Process of Unit Operation	97	78	175	7.00	C

	2	FEK407	Power Plants	97	78	175	7.00	C
	3	FEK408	Modeling and Simulation	97	78	175		
	4	FEK409	Reactors Design	65	85	150		
	5	FEK410	Graduation Project (Practical)	30	45	75		
				386	364	750		
				2946	3054	6000		

Note: The student should complete 4 weeks of Summer Internships to fullfil the requirements of the Bachelor's degree

Structured SWL (hr/w) type				
	CL	Class Lecture	Student Workload	
	Lab	Laboratory	Structured SWL	
	Pr	Practical Training	Unstructured SWL	
	Tut	Tutorial		
	Lect	Online lecture		
	Semn	Seminar		

Program Manager:

Morad A. Reduha | Ph.D. in Chemical engineering / fuel and energy | Lecturer.

Email: morad.a.radha@ntu.ed

Mobile no.: 07730128808

Program Coordinator:

Mohamad Q.Abd Alrahman | Ph.D. in Chemical Engineering / Water Treatment | Lecturer.

Email: Mohammed83 @ntu.edu.iq

Mobile no.: 07701331999

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي